

Claims:

1. Method for extracting hydrogen from a gas that contains methane, particularly natural gas,

whereby hydrocarbons contained in the gas are catalytically split into hydrogen, carbon monoxide, and carbon dioxide in a reformer (4), by means of steam, and catalytic conversion of the carbon monoxide that was formed to carbon dioxide and hydrogen takes place in a subsequent conversion stage, with steam,

whereby the carbon dioxide is removed from the converted gas stream (8) by means of a gas scrubber (7), and the scrubbed, hydrogen-rich gas stream (10) is subsequently separated into a product gas stream (12) that consists of hydrogen, and a waste gas stream (13), in a pressure swing adsorption system (11), and

whereby the waste gas stream (13) is passed to the reformer (4), together with hydrogen (14) that is branched off from the gas stream (10) behind the gas scrubber (7), as a combustion gas that is extensively free of carbon, and burned there.

2. Method according to claim 1, characterized in that a conversion reactor (5) operated at medium temperature, or a high-temperature conversion reactor (5') having a subsequent low-temperature conversion reactor (5'') is used for the conversion stage.

3. Method according to claim 1 or 2, characterized in that technically pure carbon dioxide (18) is separated in the gas scrubber (7), which is used for technical applications or processed further to produce a product (21) having a quality that can be used in the foods industry.

4. System for carrying out the method according to one of claims 1 to 3, having

- at least one reformer (4) having a combustion chamber (3), for catalytic splitting of gaseous hydrocarbons with steam,
- a conversion stage having at least one conversion reactor (5) for catalytic conversion of carbon monoxide to carbon dioxide and hydrogen, with steam,

- a gas scrubber (7) for separating carbon dioxide from the gas stream (8) that leaves the conversion stage, and
- a subsequent pressure swing absorption system (11) for isolating hydrogen (12), to which a gas line (17) that is passed back to the combustion chamber (3) is connected, for firing the reformer with a gas stream that exits from the adsorption system,

whereby an additional device (19) is provided for passing back part (14) of the hydrogen-rich gas stream (10) that leaves the gas scrubber (7) into the combustion chamber (3) of the reformer (4).

5. System according to claim 4, characterized in that the conversion stage comprises a conversion reactor (5) operated at medium temperature, or a high-temperature conversion reactor (5') with a subsequent low-temperature conversion reactor (5'').

6. System according to claim 4 or 5, characterized in that a purification stage (9) for concentrating the separated carbon dioxide (18) follows the carbon dioxide exit of the gas scrubber (7).